Agency for Healthcare Research and Quality
Advancing Excellence in Health Care

NATIONAL GUIDELINE CLEARINGHOUSE

# General

## Guideline Title

Congress of Neurological Surgeons systematic review and evidence-based guidelines on otologic and audiologic screening for patients with vestibular schwannomas.

## Bibliographic Source(s)

Sweeney AD, Carlson ML, Shepard NT, McCracken DJ, Vivas EX, Neff BA, Olson JJ. Congress of Neurological Surgeons systematic review and evidence-based guidelines on otologic and audiologic screening for patients with vestibular schwannomas. Neurosurgery. 2018 Feb 1;82(2):E29-31. [21 references] PubMed

## Guideline Status

This is the current release of the guideline.

This guideline meets NGC's 2013 (revised) inclusion criteria.

# NEATS Assessment

National Guideline Clearinghouse (NGC) has assessed this guideline's adherence to standards of trustworthiness, derived from the Institute of Medicine's report Clinical Practice Guidelines We Can Trust.

= Poor = Fair = Good = Very Good = Excellent

| Assessment | Standard of Trustworthiness |
|---|---|
| YES | Disclosure of Guideline Funding Source |
| | Disclosure and Management of Financial Conflict of Interests |
| | Guideline Development Group Composition |
| YES | Multidisciplinary Group |

| | |
|---|---|
| UNKNOWN | Methodologist Involvement |
| ▮▯▯▯▯ | Patient and Public Perspectives |
| | Use of a Systematic Review of Evidence |
| ▮▮▮▮▮ | Search Strategy |
| ▮▮▮▮▮ | Study Selection |
| ▮▮▮▮▯ | Synthesis of Evidence |
| | Evidence Foundations for and Rating Strength of Recommendations |
| ▮▮▮▯▯ | Grading the Quality or Strength of Evidence |
| ▮▮▮▮▯ | Benefits and Harms of Recommendations |
| ▮▮▮▮▮ | Evidence Summary Supporting Recommendations |
| ▮▮▮▯▯ | Rating the Strength of Recommendations |
| ▮▮▮▮▮ | Specific and Unambiguous Articulation of Recommendations |
| ▮▯▯▯▯ | External Review |
| ▮▮▮▯▯ | Updating |

# Recommendations

## Major Recommendations

Definitions for the classification of evidence (I-III) and levels of recommendations (1-3) are provided at the end of the "Major Recommendations" field.

Question 1

What is the expected diagnostic yield for vestibular schwannomas when using a magnetic resonance image (MRI) to evaluate patients with previously published definitions of asymmetric sensorineural hearing loss?

Target Population

These recommendations apply to adults with an asymmetric sensorineural hearing loss on audiometric testing.

Recommendation

*Level 3*: On the basis of an audiogram, it is recommended that MRI screening on patients with ≥10 decibels (dB) of interaural difference at 2 or more contiguous frequencies or ≥15 dB at 1 frequency be pursued to minimize the incidence of undiagnosed vestibular schwannomas. However, selectively screening patients with ≥15 dB of interaural difference at 3000 Hz alone may minimize the incidence of MRIs performed that do not diagnose a vestibular schwannoma.

Question 2

What is the expected diagnostic yield for vestibular schwannomas when using an MRI to evaluate patients with asymmetric tinnitus, as defined as either purely unilateral tinnitus or bilateral tinnitus with subjective asymmetry?

Target Population

These recommendations apply to adults with subjective complaints of asymmetric tinnitus.

Recommendation

*Level 3*: It is recommended that MRI be used to evaluate patients with asymmetric tinnitus. However, this practice is low yielding in terms of vestibular schwannoma diagnosis (<1%).

Question 3

What is the expected diagnostic yield for vestibular schwannomas when using an MRI to evaluate patients with a sudden sensorineural hearing loss

Target Population

These recommendations apply to adults with a verified sudden sensorineural hearing loss on an audiogram.

Recommendation

*Level 3*: It is recommended that MRI be used to evaluate patients with a sudden sensorineural hearing loss. However, this practice is low yielding in terms of vestibular schwannoma diagnosis (<3%).

Definitions

American Association of Neurological Surgeons/Congress of Neurological Surgeons Classification of Evidence on Diagnosis and Levels of Recommendation

| | |
|---|---|
| Class I Evidence Level 1 Recommendation | Evidence provided by one or more well-designed clinical studies of a *diverse* population using a "gold standard" reference test in a blinded evaluation appropriate for the diagnostic applications and enabling the assessment of sensitivity, specificity, positive and negative predictive values, and, where applicable, likelihood ratios. |
| Class II Evidence Level 2 Recommendation | Evidence provided by one or more well-designed clinical studies of a *restricted* population using a "gold standard" reference test in a blinded evaluation appropriate for the diagnostic applications and enabling the assessment of sensitivity, specificity, positive and negative predictive values, and, where applicable, likelihood ratios. |
| Class III Evidence Level 3 Recommendation | Evidence provided by expert opinion or studies that do not meet the criteria for the delineation of sensitivity, specificity, positive and negative predictive values, and, where applicable, likelihood ratios. |

## Clinical Algorithm(s)

None provided

# Scope

## Disease/Condition(s)

Vestibular schwannomas

## Guideline Category

Diagnosis

Screening

## Clinical Specialty

Neurological Surgery

Neurology

Otolaryngology

Radiology

## Intended Users

Physicians

## Guideline Objective(s)

To analyze the predictive value of different audiologic symptoms and findings as they relate to vestibular schwannoma (VS) diagnosis

## Target Population

- Adults with an asymmetric sensorineural hearing loss on audiometric testing
- Adults with subjective complaints of asymmetric tinnitus
- Adults with a verified sudden sensorineural hearing loss on an audiogram

## Interventions and Practices Considered

Magnetic resonance imaging (MRI)

## Major Outcomes Considered

Diagnostic yield for vestibular schwannomas

# Methodology

## Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Primary Sources)

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

# Description of Methods Used to Collect/Select the Evidence

Search Strategies

The authors collaborated with a medical librarian to search for articles published between January 1, 1990 and December 31, 2014. Three electronic databases were searched (PubMed, EMBASE, and Web of Science). Strategies for searching electronic databases were constructed by the evidence-based clinical practice guideline taskforce members and the medical librarian using previously published search strategies to identify relevant studies (see Figure 1 and Table 1 in the full guideline [see the "Availability of Companion Documents" field]).

Study Selection and Eligibility Criteria

Eight hundred and six citations were manually reviewed by the task force with specific inclusion and exclusion criteria as outlined below. Two independent reviewers reviewed and abstracted full-text data for each article, and the 2 sets of data from each reviewer were compared for agreement by a third party. Inconsistencies were re-reviewed and disagreements were resolved by consensus. Citations that considered the audiologic symptom profile of patients with vestibular schwannomas (VSs) were considered. To be included in this guideline, an article had to be a report with key study parameters including:

- Investigated patients suspected of having VS
- Human subjects
- Was not an in vitro study
- Was not a biomechanical study
- Was not performed on cadavers
- Published between January 1, 1990 and December 31, 2014
- Published in a peer-reviewed journal
- Was not a meeting abstract, editorial, letter, or commentary
- Was published in English
- Quantitatively presented results

Additional inclusion criteria:

- Investigated patients diagnosed with a VS either radiographically (i.e., a contrast-enhanced magnetic resonance imaging [MRI] or a heavily weighted T2 sequence [i.e., FIESTA sequences] was used for diagnosis of the tumor) or histopathologically (i.e., VS was identified on surgical pathology, regardless of the imaging findings)
- Involved a distinct analysis of VS patients in reviews that included various pathologies of the internal auditory canal (IAC) and cerebellopontine angle (CPA)
- Verified pure tone thresholds and word recognition with formal audiometry
- Included at least 30 patients

The authors supplemented searches of electronic databases with manual screening of the bibliographies of all retrieved publications. The authors also searched the bibliographies of recent systematic reviews and other review articles for potentially relevant citations. All articles identified were subject to the study selection criteria listed above. As noted above, the guideline committee also examined lists of included and excluded studies for errors and omissions. The authors went to great lengths to obtain a complete set of relevant articles to ensure that the guideline is not based on a biased subset of articles. The authors did not include systematic reviews, guidelines, or meta-analyses conducted by others. These documents were developed using different inclusion criteria than those specified in the guideline. Therefore, they may have included studies that do not meet the inclusion criteria. The authors recalled these documents if their abstract suggested that they might address one of the recommendations, and searched their bibliographies for additional studies.

# Number of Source Documents

Seventeen studies were included as evidence. See Figure 1 in the full guideline (see the "Availability of Companion Documents" field).

## Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

## Rating Scheme for the Strength of the Evidence

American Association of Neurological Surgeons/Congress of Neurological Surgeons Classification of Evidence on Diagnosis and Levels of Recommendation

| | |
|---|---|
| Class I Evidence Level 1 Recommendation | Evidence provided by one or more well-designed clinical studies of a *diverse* population using a "gold standard" reference test in a blinded evaluation appropriate for the diagnostic applications and enabling the assessment of sensitivity, specificity, positive and negative predictive values, and, where applicable, likelihood ratios. |
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| Class III Evidence Level 3 Recommendation | Evidence provided by expert opinion or studies that do not meet the criteria for the delineation of sensitivity, specificity, positive and negative predictive values, and, where applicable, likelihood ratios. |

## Methods Used to Analyze the Evidence

Systematic Review with Evidence Tables

## Description of the Methods Used to Analyze the Evidence

Data Collection Process

Evidence tables for the 3 questions were constructed using key study parameters as previously described. During the development process, the panel participated in a series of conference calls and meetings.

Study Selection, Quality Assessment, and Statistical Methods

Articles that met the eligibility criteria were grouped according to the questions they addressed and used to create the evidence tables and scientific foundation sections. Reasons for exclusion for papers were also documented to be able to discuss pertinent problem citations in the scientific foundation as needed.

Studies that met the eligibility criteria were subject to more detailed scrutiny and had their data extracted by 1 reviewer and the extracted information was checked by 1 or more other reviewers. Evidence and summary tables, reporting the extracted study information and evidence classification, were generated for all the included studies for each of the questions. Evidence tables were created with the most recent data first and subsequent listings in retrograde chronological order. The table headings consisted of first author name and year, followed by a brief study description, chosen data class, and conclusion. The authors were directed to craft the data in the tables in a succinct and fact-filled manner to allow for rapid understanding of the literature entry by the readership. The literature in the evidence tables was expanded upon in the Results section of each guideline article to emphasize important points supporting its classification and contribution to recommendations. The method by which this was accomplished is expanded upon in the Joint Guideline Committee (JGC) Guideline Development

Methodology document (see the "Availability of Companion Documents" field).

## Methods Used to Formulate the Recommendations

Expert Consensus (Nominal Group Technique)

## Description of Methods Used to Formulate the Recommendations

Internal drafts of the tables and manuscripts were developed by sharing them between writers electronically, by telephone, and in face-to-face meetings. Summary and conclusion statements were included for each section, with comments on key issues for future investigation being added where pertinent.

Writing Group and Question Establishment

The Joint Tumor Section of the American Association of Neurological Surgeons (AANS) and the Congress of Neurological Surgeons (CNS) identified vestibular schwannoma (VS) management as a topic worthy of guideline development. Members of the Tumor Section and other neurosurgeons and members of other specialties commonly involved in the management of VSs were identified to form the Vestibular Schwannoma Evidence-Based Practice Guideline Task Force (i.e., the "task force"). The writers were then divided up into topic sections and developed pertinent questions for those topics. These were circulated among the entire task force, modified, and agreed upon. With these questions in hand, the literature searches were executed. Additional details regarding the literature search and review methodology can be found in the Introduction and Methodology Chapter (see the "Availability of Companion Documents" field). This guideline was then developed using multiple iterations of written review conducted by the authors, then by members of the task force, and finally by AANS/CNS Joint Guideline Committee (JGC).

Classification System and Recommendation Formulation

The concept of linking evidence to recommendations has been further formalized by the American Medical Association (AMA) and many specialty societies, including AANS, CNS, and the American Academy of Neurology (AAN). This formalization involves the designation of specific relationships between the strength of evidence and the strength of recommendations to avoid ambiguity. Refer to the "Rating Scheme for the Strength of the Evidence" field.

Guideline Panel Consensus

Multidisciplinary writing groups were created for each section based on author expertise to address each of the disciplines and particular areas of therapy selected for these clinical guidelines. Each group was involved with literature selection, creation and editing of the evidence tables, and scientific foundations for their specific section and discipline. Using this information, the writing groups then drafted the recommendations in answer to the questions formulated at the beginning of the process, culminating in the clinical practice guideline for their respective discipline. The draft guidelines were then circulated to the entire clinical guideline panel to allow for multidisciplinary feedback, discussion, and ultimately approval.

## Rating Scheme for the Strength of the Recommendations

See the "Rating Scheme for the Strength of the Evidence" field.

## Cost Analysis

The authors of one study report that the "rule of 3000" (interaural asymmetry ≥15 dB at 3000 Hz) offers the most cost-effective audiometric screening criterion for VS diagnosis.

## Method of Guideline Validation

Internal Peer Review

## Description of Method of Guideline Validation

Approval Process

The completed evidence-based clinical practice guidelines for the management of vestibular schwannomas (VSs) were presented to the Joint Guideline Committee (JGC) of the American Association of Neurological Surgeons (AANS) and the Congress of Neurological Surgeons (CNS) for review. The reviewers for the JGC were vetted by *Neurosurgery* for suitability and expertise to serve as reviewers for the purposes of publication in that journal also. The final product was then approved and endorsed by the executive committees of both the AANS and CNS before publication in *Neurosurgery.*

# Evidence Supporting the Recommendations

## Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

# Benefits/Harms of Implementing the Guideline Recommendations

## Potential Benefits

Appropriate magnetic resonance imaging (MRI) screening and evaluation of patients with suspected vestibular schwannoma (VS)

## Potential Harms

Missed tumor diagnosis (false negative screen) or an unremarkable scan (false positive screen)

# Qualifying Statements

## Qualifying Statements

Disclaimer of Liability

This clinical systematic review and evidence-based guideline was developed by a multidisciplinary physician volunteer task force and serves as an educational tool designed to provide an accurate review of the subject matter covered. These guidelines are disseminated with the understanding that the recommendations by the authors and consultants who have collaborated in their development are not meant to replace the individualized care and treatment advice from a patient's physician(s). If medical advice or assistance is required, the services of a competent physician should be sought. The proposals contained in these guidelines may not be suitable for use in all circumstances. The choice to implement any particular recommendation contained in these guidelines must be made by a managing physician in

light of the situation in each particular patient and on the basis of existing resources.

# Implementation of the Guideline

## Description of Implementation Strategy

An implementation strategy was not provided.

## Implementation Tools

Quick Reference Guides/Physician Guides

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

# Institute of Medicine (IOM) National Healthcare Quality Report Categories

## IOM Care Need

Living with Illness

## IOM Domain

Effectiveness

# Identifying Information and Availability

## Bibliographic Source(s)

Sweeney AD, Carlson ML, Shepard NT, McCracken DJ, Vivas EX, Neff BA, Olson JJ. Congress of Neurological Surgeons systematic review and evidence-based guidelines on otologic and audiologic screening for patients with vestibular schwannomas. Neurosurgery. 2018 Feb 1;82(2):E29-31. [21 references] PubMed

## Adaptation

Not applicable: The guideline was not adapted from another source.

## Date Released

2018 Feb 1

## Guideline Developer(s)

Congress of Neurological Surgeons - Professional Association

## Source(s) of Funding

These evidence-based clinical practice guidelines were funded exclusively by the Congress of Neurological Surgeons and the Tumor Section of the Congress of Neurological Surgeons and the American Association of Neurological Surgeons, which received no funding from outside commercial sources to support the development of this document.

## Guideline Committee

Vestibular Schwannoma Evidence-Based Practice Guideline Task Force

## Composition of Group That Authored the Guideline

*Task Force Members*: Alex D. Sweeney, MD, Bobby R. Alford Department of Otolaryngology–Head and Neck Surgery and Department of Neurosurgery, Baylor College of Medicine, Houston, Texas; Matthew L. Carlson, MD, Department of Otorhinolaryngology and Department of Neurosurgery, Mayo Clinic School of Medicine, Rochester, Minnesota; Neil T. Shepard, PhD, Department of Otorhinolaryngology, Mayo Clinic School of Medicine, Rochester, Minnesota; D. Jay McCracken, MD, Department of Neurosurgery, Emory University School of Medicine, Atlanta, Georgia; Esther X. Vivas, MD, Department of Otolaryngology–Head and Neck Surgery, Emory University School of Medicine, Atlanta, Georgia; Brian A. Neff, MD, Department of Otorhinolaryngology and Department of Neurosurgery, Mayo Clinic School of Medicine, Rochester, Minnesota; Jeffrey J. Olson, MD, Department of Neurosurgery, Emory University School of Medicine, Atlanta, Georgia

## Financial Disclosures/Conflicts of Interest

Conflict of Interest (COI)

The Vestibular Schwannoma Guidelines Task Force members were required to report all possible COIs prior to beginning work on the guideline, using the COI disclosure form of the AANS/CNS Joint Guidelines Committee, including potential COIs that are unrelated to the topic of the guideline. The CNS Guidelines Committee and Guideline Task Force Chair reviewed the disclosures and either approved or disapproved the nomination. The CNS Guidelines Committee and Guideline Task Force Chair are given latitude to approve nominations of Task Force members with possible conflicts and address this by restricting the writing and reviewing privileges of that person to topics unrelated to the possible COIs. The conflict of interest findings are provided in detail in the companion introduction and methods manuscript (see the "Availability of Companion Documents" field).

## Guideline Endorser(s)

American Association of Neurological Surgeons - Medical Specialty Society

## Guideline Status

This is the current release of the guideline.

This guideline meets NGC's 2013 (revised) inclusion criteria.

## Guideline Availability

Available from the Neurosurgery Web site.

## Availability of Companion Documents

The following are available:

Congress of Neurological Surgeons systematic review and evidence-based guidelines on otologic and audiologic screening for patients with vestibular schwannomas. Full guideline. Schaumburg (IL): Congress of Neurological Surgeons (CNS); 2017 Dec 22. 49 p. Available from the Congress of Neurological Surgeons (CNS) Web site.

Congress of Neurological Surgeons systematic review and evidence-based guidelines on the treatment of adults with vestibular schwannomas: introduction and methods. Schaumburg (IL): Congress of Neurological Surgeons (CNS); 2017 Dec 22. 28 p. Available from the CNS Web site.

Olson JJ, Kalkanis SN, Ryken TC. Congress of Neurological Surgeons systematic review and evidence-based guidelines on the treatment of adults with vestibular schwannomas: executive summary. Neurosurgery. 2018 Feb 1;82(2):129-34. Available from the Neurosurgery Web site.

Congress of Neurological Surgeons (CNS). Guideline development methodology: endorsed by the American Association of Neurological Surgeons (AANS), the Congress of Neurological Surgeons (CNS), and the AANS/CNS Joint Guideline Committee. Schaumburg (IL): Congress of Neurological Surgeons (CNS); 2012 Feb. 12 p. Available from the CNS Web site.

## Patient Resources

None available

## NGC Status

This NGC summary was completed by ECRI Institute on May 7, 2018. The information was verified by the guideline developer on June 4, 2018.

This NEATS assessment was completed by ECRI Institute on April 25, 2018. The information was verified by the guideline developer on June 4, 2018.

## Copyright Statement



# Disclaimer

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